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[Issued with Army Orders for January, 1923.]

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GUN DRILL

FOR

7 JAN 1923

VICTORY

60-Pounder B.L. Gun, Marks II & II*,
CARRIAGES, MARK IV.

1923.



LONDON:

PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE.

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By Command of the Army Council,

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[THE WAR OFFICE,
January, 1923.

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GENERAL INSTRUCTIONS.

Practical instruction in the equipment should be given to each recruit before any attempt is made to instruct him in gun drill.

In teaching the duties of each man at the gun, the instructor should try to do so by reasoning rather than by a long explanation in words. By means of questions he should try to draw from the recruit the correct answers as to his duties, being careful to lead the man's mind into the desired channel of thought. Should this attempt fail, the instructor should give a demonstration emphasizing the points the recruit has not grasped. Such demonstrations should deal with the work of each man in the detachment, and all men under instruction should, in turn, carry out the work of each particular man.

Instruction in gun drill should begin as soon as the men are conversant with all parts of the equipment, and can handle in the best and quickest manner each of the working parts of the gun. Once the work of each man has been thoroughly mastered, it should not take long for the recruit to learn the actual drill.

It is most important that a marked distinction should be drawn between instruction and drill.

During the former the language used should be as simple as possible, and the meaning of all technical terms which are necessary must be carefully explained. A conversational tone should be adopted and in no circumstances whatever should anything in the nature of long quotations from drill

books be allowed. The men should be permitted to assume an easy attitude and their interest should not be allowed to flag. They should be encouraged to ask questions.

At drill, on the contrary, rigid discipline must be maintained, orders must be clear and decisive and the detachments made to work steadily, smartly and rapidly. At the same time the utmost accuracy is essential and any deviations from the methods laid down must at once be checked.

CHAPTER I.—GENERAL DUTIES.

This chapter summarizes the duties of the section commander and each man of the detachment. It is only intended as a guide for the instructor, who should use his own words in explaining the various duties to the men.

The detachment is composed of ten men. The service of the gun is divided between them as follows :—

1	...	...	...	...	in command.
2	...	...	...	...	the breech.
3 and 4	...	...	...	...	the sights.
2 and 5	...	...	...	...	the trail.
6 and 10	...	...	...	...	the cartridges.
7, 8 and 9	...	...	...	...	the shell.

On coming into action all small stores, not actually required for each round, will be placed in a convenient position, normally on the right of the gun.

The duties of the section commander and of each man are as follows :—

DUTIES OF SECTION COMMANDER.

NOTE.—On service it may not always be possible for section commanders to be with their sections in action, and it may be inadvisable to withdraw a No. 1 from his gun to act as section commander. In this case, such of the following duties as affect

both guns will be performed by the G.P.O. (gun position officer) and such as affect individual guns by the Nos. 1.

1. He COMMANDS his section and is responsible for the serviceability of its EQUIPMENT and the correctness of its DRILL.

2. He places himself where he can best see and hear the B.C. or G.P.O. and will only move about when necessary for the supervision of his section. In ordinary circumstances he should be on the flank of his section nearest the command post.

3. He will acknowledge orders from the command post by saluting with the hand nearest the G.P.O., finishing with the hand vertically above the head.

He only passes ORDERS when he sees that his Nos. 1 or the neighbouring section commander have failed to acknowledge.

4. He supervises the TESTING and ADJUSTMENT of the sights of his section.

5. He keeps a RECORD of the MUZZLE VELOCITY, DROOP and JUMP of his guns and also of their ZERO LINE READINGS to the AUXILIARY AIMING POINT and BATTERY PICKET. He will not keep any record of orders during a shoot.

6. He reports the CREST ANGLES to the G.P.O. when ordered to do so.

7. He is RESPONSIBLE that, before fire is opened on any target, his guns are layed in the DIRECTION ORDERED.

This is best done not by inspection of the sights, but by comparing the line of his two guns and the flank guns of the

neighbouring sections by looking along the line of each with reference to some distant object either in front or rear.

8. He **CONTROLS** his section in action.

This control is best carried out by watching and listening rather than by personal inspection of sights, &c., *e.g.*, as regards deflection corrections, observation of which hand is used by 3 will ensure deflections being put on in the correct direction; as regards fuze setting, comparison of the fuze lengths called out will expose any considerable error.

9. When his section is **RANGING**, if one gun miss-fires he will fire **BOTH ELEVATIONS** from the other gun, the higher elevation first.

10. At **BATTERY FIRE** he will report to the G.P.O. when one of his guns **MISSES ITS TURN**.

11. He will **REPORT** to the G.P.O. when either of his guns goes **OUT OF ACTION** or when he finds that an **ERROR** has been made which is likely to have **AFFECTED THE SHOOTING**.

DUTIES OF 1.

1. He **COMMANDS** and is responsible for the entire service of his gun.

2. He gives the **WORDS OF COMMAND** detailed for him in Chapter II, and repeats all **ORDERS** affecting his detachment which have not been heard by the men concerned. His orders must be given clearly, but no louder than is necessary to enable his detachment to hear.

He assists in passing orders down the battery when necessary.

He acknowledges all orders by saluting. He will salute with the hand nearest the gun position officer, finishing with the hand vertically above the head.

3. He is responsible :—

- i. That the BUFFER is properly filled. He sees that the oil in the tank shows half way up the inspection window (or sight glass) and that the ISOLATING VALVE is open.
 - ii. That the RECUPERATOR is correctly charged with liquid and air; that is when the tell-tale rod is flush with the front of its cover.
 - iii. That the GLANDS, CUT-OFF GEAR and SECURING NUTS are correct.
 - iv. That the PROTRUSION of the STRIKER is correct.
 - v. That the SIGHTS are tested. This is done under the supervision of the section commander.
 - vi. That the MUZZLE VELOCITY of the gun is correctly set on the sight carrier and fuze indicator.
4. On coming into action he procures the ADAPTER and PRESSURE GAUGE, buffer and recuperator SPANNERS.
5. The GUN PLATFORM should be on firm and level ground. If this cannot be found and time permits, the higher wheel is dug in. Failing this he orders 3 to adjust the traversing gear so that the breech is about 2 degrees towards the higher wheel.
6. He ascertains, when ordered, the CREST ANGLE, and reports it to the section commander.

7. He selects the auxiliary aiming point and records on the slate the ZERO LINE angles from the auxiliary aiming point and battery picket.

8. Before the gun is layed on a NEW TARGET he gauges the line of fire and directs the gun into line. One foot at the trail eye corresponds to about 5 degrees of traverse.

9. (i) He applies—

(a) The POSITION CORRECTION which, if required, is ordered in the form :—

“ POSITION CORRECTION, No.... plus (or minus)... mins.,” and is applied to all elevations ordered but is cancelled when a fresh target is ordered.

(b) Corrections during fire for effect, which are ordered in the form :—

“ No.... add (or drop)... mins.”

These are cancelled when a fresh elevation is ordered.

(ii) When laying by field clinometer he applies the INDEX CORRECTION (if any) of his clinometer and passes corrected elevations to 4.

(iii) When using FUZE LENGTHS he applies the necessary correction to the fuze.

(iv) When time fuzes are issued for which there is no fuze indicator, 1 will be provided with a fuze correction board on which will be shown corrections to fuze lengths required for gain or loss of the M.V. of the gun.

10. When an angle of sight is ordered, he examines the setting of the SIGHT CLINOMETER. He occasionally examines the settings of the ELEVATION and FUZE INDICATORS and DIAL SIGHT.

11. He supervises the preparation and supply of AMMUNITION. As time fuzes deteriorate rapidly if unprotected from damp, only such as are required for immediate use will be uncovered. When one group of ammunition is nearly expended, he reports particulars of the next group to be used.

12. He supervises LOADING.

He sees that the caps of No. 106 fuzes have been removed, and examines the setting of time fuzes.

He supplies the rammer to 5 and replaces it after ramming. It is important to keep the rammer and sponge free from mud and grit.

The shell should be rammed home vigorously with a good travel. The sound of the driving band engaging the rifling should be distinctly heard. Irregularity in ramming causes irregular shooting, especially when the gun is worn.

He sees that the correct charge is loaded.

13. He gives the order to FIRE. The gun will on no account be fired without his order. Before giving this order he sees that the *red lines on the breech and breech screw coincide* and that the gun is in all respects ready.

14. He is responsible that the INTERVAL between rounds is properly kept as regards his own gun. When a salvo or quick rate of battery fire (less than 5 seconds interval) is ordered, he extends his right arm above his head as soon as his gun is ready to fire.

15. At intervals he checks the LENGTH OF RECOIL.

He compares the elevation given by the recoil indicator with the elevation on the brass elevation arc situated in front of the sight.

16. If the run out during the last few inches is either sluggish or violent, he adjusts the VALVE, ADJUSTING RUN OUT.

17. He watches the action of the SPADE on recoil and adjusts its support if necessary.

18. When RAPID or PROLONGED FIRING takes place he takes every opportunity of attending to his equipment. The chamber, mushroom head and breech block should constantly be sponged with water. If the gun is hot, the bore should be cooled with water when "Stand easy" is ordered.

19. To avoid damage when TRAVELLING, if the tactical situation permits, the carrier, No. 7 dial sight, No. 9, should be removed, and carried in the sight box.

20. When firing at high angles of elevation he sees that a hole is dug below the trail to CLEAR the BREECH on recoil. If this is not done serious damage may result.

DUTIES OF 2.

1. He works the BREECH MECHANISM and FIRES the gun. He is responsible for the BRAKE and the breech and muzzle COVERS. With 5 he tests and adjusts the OBTURATING PAD, applies DRAGROPES and TRAVERSES the trail.

2. At preparation for action:—

- i. He straps the TUBE POCKET round his waist and fills it with tubes.
- ii. He places the LANYARD round his neck and tucks the ends into his belt.

- iii. He sees that the VENT BIT, RIMER, OIL-CAN, and TOOL, ISOLATING VALVE are in the pockets and that the TOOL CASE is correctly packed.

3. On coming into action :—

- i. He, assisted by 5, places the sight box on the right of the gun, after 3 and 4 have removed the sights.
 - ii. He procures the breech mechanism WRENCH and SPONGE CLOTH.
 - iii. He places his HANDSPIKE, point inwards and bevel up, 1 yard clear of the handspike socket on the right of the trail, DRAGROPE outside the handspike.
 - iv. He places the BAR SUPPORTING CRADLE and CROSSHEAD on the right of the gun.
- 4.—i. To OPEN the BREECH : He takes hold of the lever breech mechanism with the left hand, and slides the hand down so as to press down the “ catch retaining,” at the same time pulling the lever to the rear, and then swinging it round to the right as far as it will go.
- ii. To CLOSE the BREECH : The above procedure is reversed. The breech must on no account be slammed.
5. At the order “ READY ” he inserts the firing peg in the lock with the right hand, places a tube in the vent chamber, pushing it well home with his left thumb ; closes the lock with the left hand, passes the lanyard under the fair lead pin, steps clear of the wheel and stands facing the front. He holds the toggle in his right hand and grasps the centre of the lanyard with his left hand.

6. At the order "FIRE" he jerks the lanyard smartly. The gun will on no account be fired without the order from 1.

7. He oils and cleans the BREECH MECHANISM when necessary during firing.

After each round, he wipes the head of the VENT AXIAL with a wet sponge cloth.

DUTIES OF 3.

1. He LAYS with 4, and is responsible for the SIGHT and CRADLE COVERS. He directs 4 when planting AIMING POSTS. He assists 1 to test the SIGHTS.

2. At preparation for action he assists 4 to fix the No. 9 CARRIER or unclamp the SIGHT HOUSING BRACKET.

3. On coming into action he places the No. 7 DIAL SIGHT in its socket.

4.—(i) He lays for LINE. At DIRECT LAYING he also lays for ELEVATION. He lays for line on the left edge of the aiming point unless otherwise ordered.

(ii) At INDIRECT LAYING with SIGHT CLINOMETER, he sets the dial sight at the angle ordered. As soon as 4 has brought the bubble of the sight clinometer approximately central he lays roughly for line. He crosslevels the sight and lays accurately for line. He reports "Set."

(iii) At INDIRECT LAYING with FIELD CLINOMETER he sets the dial sight and sight clinometer at the angles ordered. As soon as 4 has

brought the bubble of the field clinometer approximately central he levels the sight clinometer by means of the elevation indicator.

He roughly lays for line, he cross-levels the sight and lays accurately for line. He reports "Set."

- (iv) At DIRECT LAYING he sets the dial sight and cowl at zero and puts on the dial sight the deflection ordered. He lays roughly on the target. After 4 has reported "Set," he cross-levels the sight and lays accurately for line and elevation. He reports "Ready."

- 5.—(i) When setting the dial sight by means of the QUICK RELEASE he moves the micrometer head through one complete turn to ensure that the teeth have re-engaged correctly.
- (ii) When SETTING a right deflection on the dial sight he turns the right micrometer head away from him with his right hand; when setting a left deflection he turns the left micrometer head towards himself with his left hand.
- (iii) When READING a left angle on the dial plate he reads the minutes off the left micrometer scale; when reading a right angle he reads the minutes off the right micrometer scale.
- (iv) When SETTING the COWL of the No. 7 dial sight at zero he makes the index marks both of the milled head and the finder coincide. He moves the arrow from right to left last.
- (v) When LAYING for LINE he turns the top of the traversing hand-wheel towards himself last.

6. For the first round the pointer of the TRAVERSING GEAR must be within 30 minutes of zero when the lay is completed, except when engaging G.F. or similar targets.

7. At CHANGE TARGET, if the angle is given as "More right (or left)" he turns the micrometer head of the dial sight through the angle ordered. If the angle is given from zero line, he sets the dial sight at the recorded zero line angle and then turns the micrometer head of the dial sight through the angle ordered.

8. CROSSHEADS are fitted to aiming posts to compensate for lateral movement of the sight. Both crossheads have similar markings and numbers. He notes which corresponding pair of numbers are in line and uses them to lay on. He directs 4 to clamp the crossheads low down, so that the bottom of the far one is just visible over the top of the near one.

9. The following are the signals used by 3:—

SIGNAL.	MEANING.
(i) When directing 2 and 5 to move the trail:—	
Palm of the hand in the required direction.	Trail right (or left).
Fist clenched	Stop traversing.
Smart tap on the thigh with the palm of the hand.	Take post.
(ii) When directing 4 to plant aiming posts:—	
Right arm extended to the right, or left arm extended to the left.	Move in the direction indicated.

SIGNAL.	MEANING.
Arm dropped	Halt.
Both arms dropped sharply from above the head.	Plant.
Upward or downward motion of the arms with both arms extended laterally.	Raise or lower the crosshead.
Both arms extended above the head and moved laterally in the required direction.	Move head of post in the direction indicated.
Both arms extended sharply upwards.	Pick up.
Both arms extended to the front (or rear).	Move to plant the far aiming post.
Body turned about and both arms extended to the rear (or both arms extend to the front).	Come in.

DUTIES OF 4.

1. He LAYS with 3 and plants AIMING POSTS. He assists 1 to test the SIGHTS.
2. At preparation for action :—
He assists 3 to fix the No. 9 CARRIER or unclamp the SIGHT HOUSING BRACKET.

3. On coming into action :—

- (i) He fixes the SIGHT CLINOMETER.
- (ii) He places the AIMING POSTS, with crossheads clamped, and FIELD CLINOMETER ready for use.
- (iii) When planting aiming posts he holds the post with the arm bent and elbow against the side at a convenient height, so that it hangs vertically with the point just clear of the ground. He moves to the right or left as directed by 3 until signalled to "Plant," when he allows the post to slip through the fingers until the point touches the ground. He then completes the planting.

4. (i) He lays for ELEVATION except at DIRECT LAYING.

- (ii) At INDIRECT LAYING with SIGHT CLINOMETER he sets the sight clinometer and elevation indicator at the angles ordered. He elevates the gun until the bubble of the sight clinometer runs to the front. He depresses the gun until the bubble is nearly in the centre of its run. As soon as 3 reports "Set" he depresses the gun until the bubble of the sight clinometer is central. He reports "Ready."

- (iii) At INDIRECT LAYING with FIELD CLINOMETER he sets the field clinometer at the elevation ordered by 1, and places it on the clinometer plane. He elevates the gun until the bubble of the field clinometer runs to the front. He depresses the gun until the bubble is nearly in the centre of its run. As soon as 3 reports "Set" he depresses the gun until the bubble of the field clinometer is central. He reports "Ready."

- (iv) At DIRECT LAYING he sets the elevation indicator at the elevation ordered. He reports "Set."
- If ordered to take the angle of sight, he levels the sight clinometer by means of the micrometer head after the gun is layed.
- 5. (i) When SETTING the SIGHT CLINOMETER he turns the top of the micrometer head towards himself last to take up backlash.
- (ii) When using the FIELD CLINOMETER he sees that the clinometer plane and the base of the clinometer are free from grit or dirt and that the clinometer is placed on the positioning marks of the plane for each lay.
- (iii) When setting the ELEVATION INDICATOR he turns the top of the elevation indicator hand-wheel to the RIGHT last.
- (iv) When laying he depresses last (top of the hand-wheel towards himself) with at least two complete turns of the hand-wheel. If the bubble of the clinometer over-runs the centre he rapidly gives the elevating hand-wheel two complete turns of elevation followed by one and a-half turns of depression before completing the lay.
- 6. At the order "LOAD" he depresses the gun to the LOADING POSITION (about 5 degrees elevation).

DUTIES OF 5.

1. He LOADS and RAMS. He is responsible for the BREECH and CHAMBER. He assists 2 to test and adjust the OBTURATING PAD, apply DRAGROPES and TRAVERSE the trail.

2. On coming into action :—

(i) He places his HANDSPIKE, point inwards and bevel up, 1 yard clear of the handspike socket on the left of the trail, and dragrope outside the handspike.

(ii) He places the RAMMER so that it rests on the rear of the trail with the spongehead uppermost.

3. At the order "LOAD" he steps inside the trail, and stands facing the right with his feet apart.

He receives a shell from 7 (or 8), fuze to his left, and places it in the chamber with the base of the shell resting over the centre of shot guide.

4. He receives the RAMMER from 1, places the rammer head against the base of the shell (at drill against the face of the breech) and slides his hands towards the spongehead as far as he can reach.

He grasps the rammer with his left hand back up, and with his right hand back down, nearest the spongehead. He rams the shell home vigorously with a good travel, and then withdraws and hands the rammer back to 1.

5. He SPONGES OUT about every third round.

6. He assists 2 with the BAR SUPPORTING CRADLE and SIGHT BOX.

DUTIES OF 6.

1. He is responsible for the supply of CARTRIDGES.

2. On coming into action he attends to the WAGON BRAKE.

(B 27/15)q

A 4

3. He (assisted by 10) sees that cartridges are:—

(i) SORTED by nature of propellant and "Group" number.

(ii) PROTECTED from extremes of temperature and from damp.

(iii) ISSUED from the group ordered.

4. When one group of cartridges is nearly expended he REPORTS to 1 the particulars of the next group.

5. He carries CARTRIDGES to the gun and loads them from the left side. He holds the cartridge for 1 to check, but in wet weather he must keep the igniter dry. He places the cartridge about 3 inches inside the chamber so that the igniter faces the vent and is just clear of the mushroom head. If the cartridge is thrown to the front of the chamber, either by 6 or by the closing of the breech screw, a miss-fire may occur.

DUTIES OF 7.

1. On coming into action, he procures the FUZE KEYS.

2. He assists 8 and 9 to prepare SHELL and carries SHELL to the gun alternately with 8. He carries the shell in the hollow of both arms, fuze to the right.

3. The CAPS of No. 106 fuzes are removed just before they are carried to the gun. On removing the cap each fuze is examined to see that the tape is correctly wound and that the ends of the shearing wire are visible. If a No. 106 fuze has become uncapped or the wire and seal is found to be broken, the fuze is to be regarded as dangerous and treated accordingly.

DUTIES OF 8.

1. On coming into action he places a PICK and SHOVEL on the right of the gun.
2. He assists 7 and 9 to prepare SHELL and carries SHELL to the gun alternately with 7. He carries the shell in the hollow of both arms, fuze to the right.
3. The caps of No. 106 fuzes are removed just before they are carried to the gun. On removing the cap each fuze is examined to see that the tape is correctly wound and that the ends of the shearing wire are visible. If a No. 106 fuze has become uncapped or the wire and seal is found to be broken, the fuze is to be regarded as dangerous and treated accordingly.
4. He attends to the WAGON PROPS.

DUTIES OF 9.

1. He is responsible for the preparation and supply of TUBES and SHELL.
2. On coming into action :—
 - (i) He fixes and works the FUZE INDICATOR on the wagon shield.
 - (ii) He follows up all orders for corrector and elevation on the FUZE INDICATOR and calls out the fuze setting loud enough for his section commander to hear.
 He always uses the reader for following up the elevation and calls out the highest fuze setting visible to the left of the edge of the reader.
 - (iii) He procures a BRUSH and a pair of PINCERS.

3. He (assisted by 7 and 8) sees that shell are :—

- (i) Scrupulously CLEAN, especially the driving bands and base. Brushes and water should be used if necessary.
- (ii) SORTED into groups by nature, driving band and weight.
- (iii) FUZED as ordered and protected from damp.
- (iv) ISSUED from the group ordered.

4. He (assisted by 7 and 8) sees that time fuzes are :—

- (i) SORTED into groups by type.
- (ii) PROTECTED from damp.

5. (i) When preparing ammunition with No. 106 FUZE no safety cap is to be removed or the wire or seal broken until the round is about to be loaded. If a No. 106 fuze has become uncapped or the wire and seal is found to be broken, the fuze is to be regarded as dangerous and treated accordingly.

(ii) He will put on one side shell with burred driving bands, and with wire or seal of No. 106 fuze broken, reporting particulars to 1. When opportunity offers the burrs will be removed under instructions from 1.

6. When one group of shell or of time fuzes is nearly expended, 9 REPORTS to 1 the particulars of the next group.

7. Time fuzes are set at the settings called by 9.

8. In action, except when using fuze 106, there should always be four ROUNDS READY for loading. When using fuze 106 and a specified number of rounds have been ordered, that number only will be prepared.

9. Before REPLACING shell in wagon :—

(i) H.E. shell except those fuze with No. 106E fuze will be unfuzed.

(ii) Fuzes of shrapnel will be set at safety.

A shell fuze with No. 106E fuze with wire or seal broken is on no account to be replaced in limber wagon or lorry.

10. He assists 10 to HOOK IN and UNHOOK the wagon team.

DUTIES OF 10.

1. He is the COVERER, SECOND IN COMMAND of the sub-section, and is in charge of the firing battery wagon.

2. In action he does any DIGGING required in the service of the gun.

He assists 6 to prepare cartridges.

3. He (assisted by 9) HOOKS IN and UNHOOKS the wagon team.

(i) To UNHOOK the wagon team, 9 detaches the off and 10 the near wheel traces from the swingle-trees, the inner traces first. 10 orders "Drive on" and steadies the pole; 9 guides the bar supporting off the pole; 10 lowers the pole.

(ii) To HOOK IN, 10 holds up the pole near the foot-board on the near side, and 9 guides the ring of the bar supporting on to the pole.

They then attach the wheel traces to the swingle-trees, attaching the outer traces first so as to keep the horses in position while they are handling the inner traces.

CHAPTER II.—GUN DRILL.

Artillery Training lays down the principles of battery tactics, which vary little with different equipments. This chapter details the orders given and the procedure by which these orders are carried out in batteries armed with the 60-pr. B.L. gun, Mark I.

The procedure must be memorised and strictly adhered to.

The executive order is shown throughout as being given by the section commander, as will normally be the case during training. When orders can be heard throughout the battery they will be acted upon without repetition. Instructors will invariably employ the orders detailed for the section commander, even when drilling a single detachment.

1. POSITIONS AT DETACHMENT REAR.

The detachment falls in two deep, one pace between ranks, 1 on the right and 10 on the left of the front rank. 1 and 10 are not covered.

When the gun is limbered up, the front rank is three paces in rear of the muzzle, 1 covering the off gun-wheel.

When the gun is in action, the front rank is one pace in rear of the trail eye, 1 covering the right gun-wheel.

2. TO TELL OFF.

Section commander.

"...section—Tell off."

1 numbers himself 1, the right-hand man of the rear rank 2, his front rank man 3, and so on.

3. TO CHANGE ROUND.

Section commander.

"...section—*Change round.*"

1 takes a pace to the rear with his right foot and a pace to the left with his left. The left-hand man of the rear rank takes a pace to the left with his left foot, and a pace to the front with his right. At the same time the remainder of the front rank take a pace to the right and the rear rank a pace to the left.

(The detachment is then again told off.)

4. TO MOVE THE GUN WITH DRAGROPES WHEN LIMBERED UP.

Section commander.

"...section—*With dragropes, prepare to advance.*"

2 and 5 hook the dragropes to the dragwashers on their own sides, the backs of the hooks downwards, 9 and 10 go to the limber pole, the remainder man the ropes, 2, 4, 6 and 8 on the near side, 3, 5 and 7 on the off.

Section commander.

"*Walk march.*"

The carriage is moved to the front.

Section commander.

"*Halt.*"

The carriage is halted, and the detachment remain at their posts.

Section commander.

" *Detachments rear.*"

2 and 5 replace the dragropes; the detachment double to their places and halt.

5. TO EXAMINE EQUIPMENT.

Examination of equipment will be carried out before leaving the gun park. When in action this procedure should be carried out at least once in every 24 hours, and advantage should be taken of any interval to examine and test equipment.

Section commander.

"...section—*Examine equipment.*"

The gun is unlimbered and each man checks his stores.

The section commander supervises the testing of sights and grouping of ammunition.

1 sees that the bore is clear, that the gun, buffer and recuperator are properly connected up and the cut off gear in adjustment. He sees that the buffer and recuperator are correctly filled and charged and that there is no leakage from the glands. He tests and adjusts the sights and sees that the elevation and fuze indicators are set at the M.V. of the gun.

He tests protrusion of the striker, and generally supervises the work of the remainder of the detachment, satisfying himself that spare parts are interchangeable, small stores complete and the equipment is in all respects ready for action.

2 removes and replaces breech and muzzle covers and with 5 removes and replaces the bar supporting cradle.

He examines the brake.

He examines the breech mechanism and with 5 tests and adjusts the obturating pad. He examines the firing lanyard and firing tubes.

3 removes and replaces the sight cover. He examines the dia. at sight, apparatus illuminating sights, cross-levelling and traversing gears. He assists 1 to test and adjust the sights.

4 examines the aiming posts, elevation indicator, sight and field clinometers and elevating gear. He assists 1 to test and adjust the sights.

5 examines the breech and chamber. He assists 2 with the bar supporting cradle and obturating pad.

6 and 10 examine and group the cartridges.

9 examines the fuze indicator.

7, 8 and 9 examine and clean shell. They group shell and fuzes as ordered by the section commander.

As soon as the examination is completed, the gun is limbered up and the detachment form detachment rear.

1 collects reports, and reports to the section commander "No.... ready for action" or otherwise.

6. TO PREPARE FOR ACTION.

Preparation for action will be carried out before moving into action.

Section commander.

"...section—Prepare for action."

Each man checks his stores.

1 sees that the bore is clear and satisfies himself that the detachment and equipment are in all respects ready for action.

2 and 5 remove the crosshead.

2 removes the breech and muzzle covers, receives cradle cover from 3 and places them in the sight box, examines the breech mechanism, fills the tube pocket, straps it round his waist and places the lanyard round his neck.

3 removes the cradle cover and hands it to 2.

3 and 4 fix the No. 9 carrier or release the sight housing bracket, examine the sighting, elevating and traversing gears.

4 examines the aiming posts.

5 examines the chamber and threads of the breech.

6 and 7 examine the firing battery wagon, 8 and 9 the first line wagon. They see that shrapnel shell are fuzeed if ordered and that the fuze keys are in their places in the limber.

9 examines the fuze indicator.

As soon as preparation for action is completed, 2 closes the breech, and, with 5, replaces the crosshead.

2 and 3 replace the covers if ordered.

The detachment form detachment rear.

1 collects reports from each man and reports to his section commander "No.... ready for action," or otherwise.

7. TO SHIFT THE GUN FROM THE TRAVELLING TO THE FIRING POSITION.

Section commander.

"...section—Shift the gun."

2, 4, 6, 8 and 10 double to the near side of the carriage, **1, 3, 5, 7 and 9** to the off, and work on their own sides.

1 releases the piston rod clamp and takes post at the elevating hand-wheel.

2 and 5 each place the eye of a hauling rope on the hooks of the carriage, seeing that the ropes are clear for heaving, **2** puts on the brake.

3 and 4 remove the rear gun-clamp and strap it to the limber.

6 and 7 adjust the crosshead to the breech and each pass a hauling rope under and over the bollards.

8 and 9 cast off the front gun-clamp and strap it to the limber.

9 withdraws the keep pin of the locking bolt.

10 withdraws the locking bolt.

The ropes are manned by **2, 3, 4 and 5** in front of the gun-wheels and **6, 7, 8 and 9** in rear of the gun-wheels; **2, 3, 4 and 5** change to the rear of the gun-wheels as the gun runs out.

2 and 3 signal "Ready" by holding up their right hands.

1 orders "Heave" and the gun is pulled to the firing position.

3 and 4 fix and tighten nuts on the piston rod and ram, replace keep pins; the remainder of the men holding on to the ropes.

As soon as the nuts are on 1 orders "Up," replaces the recoil indicator slider and releases the brake.

2 and 5 cast off the ropes and replace them.

10 replaces the locking bolt, 9 securing it with a keep pin.

On completing their duties, the detachment form detachment rear.

8. TO COME INTO ACTION.

Action rear.

Section commander.

"...section—Action rear."

1 places himself dismounted so that he can see when his gun is in the required position. He then orders "Halt—Action rear."

2 and 5 place their handspikes in the sockets; 2, 3, 4 and 5 man the handspikes facing the front.

6 and 7 go to the coupling piece.

7 removes the pin.

1 orders "Lift" and the trail is lifted clear.

1 orders "Limber drive on" and the limber moves clear. "Lower" and the trail is lowered to the ground.

The limber advances 5 yards and halts for stores to be removed.

7 replaces the coupling pin. The limber proceeds at a trot until well clear of the battery position, and then at a walk to the wagon line under the direction of the battery serjeant-major.

The wagon halts 20 yards in rear of the gun until the gun is roughly in the line of fire.

1 signals "Advance." The wagon drives up on the left of the gun and halts with the centre of the perch in line with the axle of the gun, 1 yard clear of the gun-wheel and inclined to the left.

6 puts on the wagon brake; 8 lowers the props; 9 and 10 unhook; 10 orders "Drive on." The team advances 1 yard, wheels left-about and proceeds at a trot until well clear of the battery position, and then at a walk to the wagon line under the direction of the battery serjeant-major.

2 and 5 remove the bar supporting cradle and crosshead.

The stores are placed in position by the men responsible for them.

The detachment take up their position in action.

If the order "Wagons right" is given the wagon drives up on the right of the gun, instead of the left, and the wagon team wheels to the right about.

Action right, Action left, Action front.

As soon as the trail has been lowered to the ground 2 makes fast a dragrope to the trail and the trail is moved in the required direction.

At "Action right" the trail is moved through a quarter of a circle to the left.

At "Action left" the trail is moved through a quarter of a circle to the right.

At "Action front" the trail is moved through a half circle to the right; but on a side slope the trail is moved downhill.

When training detachments in these movements, the details given under "Action rear" must be modified with regard to movement of the limber and trail.

NOTE.—On dismounted parades 6, 7, 8, 9 and 10 man the gun limber; 6, 7 and 8 in rear, 9 and 10 at the pole.

9. POSITIONS IN ACTION.

1 where he can best superintend the work of the detachment.

2 on the right of the gun, close to the breech, facing the front.

3 on the left of the gun, in rear of the dial sight, facing the front.

4 outside the left gun-wheel, in line with the sight, facing the right.

5 on the left of the trail, one yard clear, facing the trail.

8 in rear of the wagon, on the side further from the gun.

10 in rear of the wagon, on the side nearer the gun.

9 between 8 and 10.

6 one yard in rear of 10.

7 one yard in rear of 9.

10. TO FORM DETACHMENT REAR IN ACTION.

Section commander.

"...section—Detachment rear."

1 doubles to his place (1 yard in rear of the trail eye and covering the right gun-wheel) and gives the order "No....,"

Double March." At the order from 1 the remainder double to their places and halt.

11. TO TAKE POST FROM DETACHMENT REAR.

Section commander.

"...section—Take post."

The detachment double to their positions in action.

12. TO OBTAIN THE LINE OF FIRE.

The line of fire is obtained by one of the methods described in Artillery Training.

13. TO LAY THE GUN IN THE LINE OF FIRE.

Section commander.

"...section—Aiming point..., degs....mins. right (or left)."

1 orders "Take post to lay"; 2 and 5 pick up their handspikes and stand by to traverse.

3 sets the dial sight as ordered.

4 sets the elevation indicator at 10 degrees and the sight clinometer at zero, and brings the bubble of the sight clinometer to the centre of its run by the elevating hand-wheel.

3 lays roughly on the aiming point, directing 2 and 5 to traverse.

3 gives the signal "Take post"; 2 and 5 replace handspikes; 2 puts on the brake.

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3 brings the cross-level bubble approximately to the centre of its run and lays accurately for line with the traversing gear.

1 points out the auxiliary aiming point and battery picket to 3.

3 reports to 1 the readings of the dial sight from the battery picket and auxiliary aiming point; 1 records them on the slate.

The section commander goes to his guns and takes a note of the angles recorded.

If necessary, 1 orders "With dragrope, trail right (or left)." 2 (or 5) mans his handspike; 5 (or 2) makes fast a dragrope to the trail; the remainder, except 1 and 3, man the rope and heave as directed by 1.

At the order "Take post to lay" 2 and 5 man the handspikes and the remainder resume their posts.

14. TO ASCERTAIN THE LOWEST ELEVATION AT WHICH THE TRAJECTORY WILL CLEAR THE CREST.

Section commander.

"...section—Report crest angle."

4 sets the elevation indicator at zero.

1 lays the gun just clear of the crest by looking along the bottom of the bore, ordering 4 to elevate or depress as required.

4 brings the bubble of the sight clinometer central by the micrometer.

1 reports the angle recorded on the sight clinometer to the section commander, who passes it to the gun position officer. The gun position officer adds to the angle reported the elevation due to range to the crest, plus allowance for safety, and reports the resultant quadrant angle to the battery commander.

NOTE.—The section commander should order the correct angle of sight to the gun, after the crest angle has been taken.

15. TO PLANT AIMING POSTS.

Section commander.

“...section—Aiming posts front (or rear).”

4 doubles out in front (or rear) of his gun with two aiming posts and plants them as directed by 3 in line with the dial sight set at zero (or 180 degrees). He plants the nearer post first at about 50 yards from the gun. He then plants the further post as far from the gun as possible up to about 100 yards.

If the order “Re-plant aiming posts” is given, 4 doubles out and at the signal from 3, pulls up the posts, the further one first, and re-plants them.

16. PARALLEL LINES TO A NAMED GUN.

ZERO LINE METHOD.

Section commander.

“...section (or No....)—Parallel lines to No....—Zero line method.”

3 of the named gun relays for line.

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1 of the named gun reports his angle right or left of his zero line.

This angle is ordered to the other guns.

AIMING POINT METHOD.

Section commander.

"...section (or No....)—Parallel lines to No....—Aiming point method."

The section commander indicates an aiming point.

3 of the named gun relays for line, swings his dial sight on to the aiming point and **1** reports the reading.

This angle, corrected if necessary for parallelism, is ordered to the other guns.

DIRECTOR METHOD.

Section commander.

"...section (or No....)—Parallel lines to No....—Director method."

3 of the named gun relays for line, swings his dial sight on to the director and **1** reports the reading. The director is set accordingly and individual angles are ordered to the other guns.

DIAL SIGHT METHOD.

Section commander.

"...section (or No....)—Parallel lines to No....—Dial sight method."

3 of the named gun relays for line. He then swings his dial sight on to the dial sight of each gun in turn.

1 reports these angles to his section commander, who passes on their supplements to the section commander concerned.

3 of each other gun sets his dial sight at the angle ordered for his gun and lays on the dial sight of the named gun.

17. TO CHECK PARALLEL LINES.

Section commander.

"...section—*Check parallel lines to No....*"

4 sets the elevation indicator at 10 degrees and brings the bubble of the sight clinometer to the centre of its run by the elevating hand-wheel.

3 cross-levels and relays for line.

3 of the named gun lays on the dial sight of each gun in turn. 1 reports the angles to his section commander who passes them to the section commanders concerned.

3 of each other gun lays on the dial sight of the named gun. 1 reports the reading to his section commander, who adds it to the angle taken by the named gun. The sum of the two angles should be 180 degrees. If necessary he corrects the zero line angles.

18. TO LOAD.

Percussion shrapnel.

Section commander.

"...section—*Shrapnel,...c.r.h. (fuze) ..., Full (or Reduced) charge.*

"... *ranging (or Method of fire)—Percussion.*"

1 repeats the ammunition order and at the correct moment orders "Load."

7 (or 8) sees that the fuze is set at safety.

4 brings the gun to the loading position (if necessary); 5 steps into the trail.

7 supplies the first shell, fuze to his right; 1 steps up to 7 and checks the setting of the fuze; 7 hands the shell to 5; 5 receives the shell from 7, fuze to his left, and places it in the chamber.

1 throws the rammer to 5; 5 rams home, throws the rammer back to 1, and jumps clear.

6 shows the cartridge to 1, places it in the chamber and reports "In."

2 closes the breech.

Time shrapnel.

Section commander.

"...*section—Shrapnel,...c.r.h. (fuze)...—Full (or Reduced) charge.*"

"...*ranging (or Method of fire)—Corrector ..., (Elevation)...*"

1 repeats the ammunition order and at the correct moment orders "Load."

9 sets the fuze indicator and calls out the fuze setting.

- 4 brings the gun to the loading position (if necessary).
- 5 steps into the trail.
- 7 (or 8) sets the fuze, removes the safety pin, and supplies the shell, fuze to his right.
- 1 steps up and checks the setting.
- 7 (or 8) hands the shell to 5; 5 receives the shell, fuze to his left, and places it in the chamber.
- 1 throws the rammer to 5; 5 rams home, throws the rammer back to 1, and jumps clear.
- 6 shows the cartridge to 1, places it in the chamber and reports "In."
- 2 closes the breech.

High explosive.

Section commander.

"...section—*H.E.*..., *c.r.h.* (fuze)...,—*Full (or Reduced) charge.*"

"...ranging (or *Method of fire.*)"

- 1 repeats the ammunition order and at the correct moment orders "Load."
- 4 brings the gun to the loading position (if necessary).
- 5 steps into the trail.
- 7 (or 8) breaks the wire and uncaps the fuze (if necessary) and supplies the shell, fuze to his right.
- 5 receives the shell, fuze to his left, and places it in the chamber.

1 throws the rammer to 5; 5 rams home, throws the rammer back to 1, and jumps clear.

6 shows the cartridge to 1, places it in the chamber and reports "In."

2 closes the breech.

During ranging (except with "time set" fuzes) the gun will be reloaded as soon as it has been fired.

During ranging (with "time set" fuzes) the gun will be reloaded as soon as the time setting has been ordered.

At a method of fire the gun will not be loaded sooner than is necessary to maintain the rate of fire.

After the first round;—

If there is no alteration in ammunition ordered, 1 only orders "Load."

If there is an alteration in ammunition ordered, 1 repeats the ammunition order for the first round only.

NOTE.—At drill the rammer will be placed against the breech ring in the action of ramming home; only drill cartridges will be loaded.

19. TO LAY THE GUN.

Indirect laying with sight clinometer.

Section commander.

"...section—...deg's....min's. more right (or left)."

"Angle of sight—...deg's....min's....elevation (or depression)."

"Position correction, No.... plus (or minus)... min's."

"(Elevation)...deg's....min's."

1 applies the position correction (if any) and passes the corrected elevation to 4.

3 puts on the deflection.

4 puts on the angle of sight and sets the elevation indicator ; elevates until the bubble of the sight clinometer runs to the front and depresses until the bubble is nearly in the centre of its run.

3 cross-levels, lays for line and reports "Set."

4 depresses until the bubble is in the centre of its run and reports "Ready."

Indirect laying with field clinometer.

Section commander.

"...section—Clinometer laying...degs....mins. more right (or left)."

"Angle of sight—... deg. ...mins. elevation (or depression)."

"(Elevation)...degs....mins."

1 applies the index correction (if any) to the elevation ordered and passes the corrected elevation to 4.

3 puts on the deflection and sets the sight clinometer.

4 sets the field clinometer, places it on the clinometer plane and elevates until the bubble runs to the front ; then depresses until the bubble is nearly in the centre of its run.

3 levels the sight clinometer by the elevation indicator hand-wheel, cross-levels, lays for line, and reports "Set."

4 depresses until the bubble is in the centre of its run, reports "Ready" and removes the clinometer.

NOTE.—When laying with field clinometer the elevation ordered is the actual elevation at which each gun is to be laid.

Direct laying.

Section commander.

"...section—Target..."

"Reference point... o'clock ... degrees..."

"Direct laying dial sight—...degs....mins. more right (or left)."

"(Elevation)...degs....mins."

1 orders "Take post to lay" and directs the gun into the line.

3 sets the dial sight and cowl at zero, puts on the deflection and sets the traversing gear at zero (or at 3 degrees traverse if the order "Target moving from..." is given).

4 sets the elevation indicated and reports "Set."

3 lays roughly, directing 2 and 5 to move the trail and gives the signal "Take post." He then cross-levels, lays direct through the dial sight on the ground line of his portion of the target and reports "Ready."

If "Indirect" is ordered, 1 selects an auxiliary aiming point and points it out to 3.

3 turns the dial sight on to this aiming point. 4 sets the sight clinometer and elevation indicator at the angle of sight and elevation ordered, and the gun is then layed indirect, with sight clinometer.

20. TO FIRE.

No. 1.

"No...."

"Fire."

1 orders "No...." shortly before it is his turn to fire.

2 inserts the firing peg with his right hand and a tube with his left hand, forcing it well home with his thumb, closes the lock and steps clear of the wheel.

3 removes the dial sight.

1, 3 and 4 step clear, 1 carrying the rammer, all face the front.

When his turn arrives, 1 orders "Fire."

2 fires the gun, puts the lanyard round his neck; 4 brings the gun to the loading position; 2 ejects the tube, opens the breech and wipes the head of the vent axial with a wet sponge cloth.

The gun will on no account be fired without the order from 1.

21. MISSFIRES.

If the gun fails to fire, 2 allows 10 seconds to elapse, ejects the tube and examines it.

(i) *If the tube has failed to fire* he examines the cap.

If not fairly struck, the lock is changed.

If fairly struck a new tube is inserted. This tube is also tried; if it fails a pause of 10 seconds is made and the lock is changed.

(ii) *If the tube has fired*, a pause of three minutes is made; 4 then depresses the gun with the elevating handwheel until 2 can open the breech. After a further pause of one minute, 1 removes and examines the cartridge.

If the cartridge is dry and serviceable, 1 re-adjusts it in the chamber; if it is damp or smouldering, he places it clear and orders a new cartridge to be loaded.

In the event of tube failing to ignite the charge, care should be taken when extracting the tube not to stand directly in rear of the gun, as the tube may fly out with some violence as soon as the lock is clear.

The vent channel sometimes becomes choked with residue from the cartridge. When this occurs the taper portion should be cleared with a "Rimer," sufficiently to allow of the insertion of a tube, which, when fired, will remove the rest of the obstruction.

None of the detachment nor cartridges should be in rear of the breech when it is opened.

22. TO CLEAR THE SPADE.

Section commander.

"...section—*Spades clear.*"

1 orders "With dragropes, run up."

2 takes off the brake.

2 and 5 make fast wheel purchases just above the brake blocks.

3 brings the traversing gear to zero.

All men except 1 and 3 man the ropes, 2, 6, 8 and 10 on the right, 4, 5, 7 and 9 on the left.

At the order from 1 the spade is cleared and the gun moved to the front or rear until the platform is satisfactory.

1 orders "Take post"; 2 and 5 replace dragropes.

10 clears the earth from the spade.

The gun is relayed.

23. TO CHANGE TARGET.

Section commander.

"...section—Target...."

"(Ammunition)...."

"...degs....mins. right (or left) of zero lines.

1 repeats the ammunition order, clears the spade and orders "With dragropes trail right (or left)," if necessary, and directs the gun into the approximate line. He then orders "Take post to lay."

3 brings the traversing gear to zero and sets the dial sight to the recorded zero line angle and turns the micrometer head through the angle ordered. 3 lays roughly for line.

6, 7, 8, 9 and 10 prepare ammunition.

Section commander.

"Angle of sight—...degs....mins. elevation (or depression)."

4 sets the sight clinometer.

1 checks the setting.

Section commander.

"...ranging (or Method of fire)."

"(Interval)... (if required).

"Percussion (or corrector)" (if necessary).

1 at the correct moment orders "Load."

The gun is loaded.

Section commander.

Elevation (or Elevations)...deg...mins.

- 1 passes the elevation to 4.
- 4 sets the elevation indicator.
- 3 lays for line and reports "Set."
- 4 lays for elevation and reports "Ready."

24. TO STOP FIRING.

Section commander.

"...section—*Stop.*"

The detachment continue their duties, but the gun is not fired until the order "Go on" is given.

25. TO STAND FAST.

Section commander.

"...section—*Stand fast.*"

All stand fast whatever they are doing.
At the order "Go on" work is continued.

26. TO STOP LOADING.

Section commander.

"...section—*Stop loading.*"

The preparation of ammunition is suspended.

The detachment continue their duties. Any gun already loaded is fired at its proper interval, but no gun will be loaded until the order "Go on" is given.

27. TO EMPTY GUNS.

Section commander.

"...section—*Empty guns.*"

Any gun loaded is layed at the last elevation and line, and fired.

If a safety pin or cap has been removed before the order is given, the loading is completed and the gun fired.

28. TO STAND EASY IN ACTION.

Section commander.

"...section (or No....)—*Stand easy.*"

This order is given to indicate that firing is temporarily suspended.

Before opening fire again the order "Take post" will be given.

29. GUNS IN POSITION.

The procedure laid down in "*Examine equipment*" in the gun park must be carried out every 24 hours and when reliefs (if any) are carried out.

In addition, 1 must see that the layers know the zero line angles to, and the position of, the auxiliary aiming point and battery picket, and that all men of the detachment are conversant with the position of the command post and ammunition supply.

1 will check the ammunition available for his gun.

30. TO PREPARE TO MOVE.

The section commander informs the Nos. 1 of the method of evacuating the position and whether a position of assembly is to be used.

Section commander.

"...section—*Prépare to move.*"

Ammunition and stores as ordered by the section commander are repacked.

Preparation for limbering up will be made as far as possible, but guns will remain in action until the order "Cease firing" is given.

30. TO CEASE FIRING.

Before "Cease firing" is ordered, guns must be empty.

Section commander.

"...section—*Empty guns. Cease firing.*"

The spado is cleared.

2 closes the breech and takes off the brake.

3 sets the traversing gear at zero.

2 and 5 replace the bar supporting cradle and cross-head.

4 elevates the gun on to the bar supporting cradle and brings in aiming posts if ordered.

6, 7, 8, 9 and 10 replace ammunition, close the lids and raise the wagon props.

6 takes off the wagon brake.

All stores (except handspikes) carried on the carriage and wagon are secured in position by the men responsible.

31. TO LIMBER UP.

Rear limber up.

Section commander.

"...section—*Rear limber up.*"

The detachment take post as follows:—

2, 4, 6 and 8 on the right of the trail, 1, 3, 5 and 7 on the left of the trail, kneeling with their backs to the axletree, 7 and 8 nearest the trail eye; 9 and 10 ready to hook in the wagon team.

The limber approaches from the right, and wheels to the left when the centre wheel horses are in line with the trail eye.

When the limber is in rear of the trail eye, 1 orders "Halt, limber up." 2 and 5 fix the handspikes; 2, 3, 4 and 5 man them; 6 and 7 go to the coupling piece; 1 and 8 man the limber wheels.

1 orders "Lift"; the trail is lifted and the coupling piece placed in position; 7 replaces the pin.

2 and 5 replace the handspikes on the carriage.

All stores carried on the limber or in the limber boxes are placed in position by the men responsible.

The detachment form detachment rear.

Front limber up.

Section commander.

"...section—*Front limber up.*"

2 hooks a dragrope to the trail.

The trail is moved through a half circle to the right.

The limber drives up on the right and 3 yards clear of the gun. When clear of the gun-wheel it inclines to the left until the near wheel of the limber has just passed the trail eye. The wagon must be man-handled clear of the gun.

*(The procedure is then as in rear limber up.)**

Right limber up.

Section commander.

"...section—*Right limber up.*"

2 hooks a dragrope to the trail.

The trail is moved through a quarter of a circle to the right.

*(The procedure is then as in front limber up.)**

Left limber up.

Section commander.

"...section—*Left limber up.*"

2 hooks a dragrope to the trail.

The trail is moved through a quarter of a circle to the left. The limber drives up on the left and 3 yards clear of the gun. When clear of the gun-wheel it inclines to the right until the off wheel of the limber has just passed the trail eye. The wagon must be man-handled clear of the gun.

*(The procedure is then as in rear limber up.)**

* When detailing "*Front (Right or Left) limber up,*" the instructor will modify the detail of "*Rear limber up*" as necessary, with regard to movement of the limber and trail.

32. TO SHIFT THE GUN FROM THE FIRING TO THE TRAVELLING POSITION.

Section commander.

"...section—*Shift the gun.*"

2, 4, 6, 8 and 10 double to the near side of the carriage, 1, 3, 5, 7 and 9 to the off and work on their own sides.

1 removes the recoil indicator slider and places it in the limber.

2 puts on the brake.

2 and 5 each place the eye of a rope on the hooks of the carriage, and see that the rope is clear for heaving on.

3 and 4 remove the keep pins and nuts from the piston rods and secure them by the pins to the projections on the sides of the carriage.

6 and 7 fix the crosshead in the muzzle and each pass a rope under and over the bollards.

9 removes the keep pin of the locking bolt.

10 removes the locking bolt.

The ropes are manned by the detachment.

2, 3, 4 and 5 in rear of the gun-wheels, 6, 7, 8 and 9 in front of the gun-wheels; 2, 3, 4 and 5 change to the front of the wheels as the gun runs back.

As soon as all are ready, 2 and 3 signal "Ready" by holding up their right hands.

1 orders "Heave," and the gun is pulled to the travelling position.

10 replaces the locking bolt.

9 secures it by the keep pin.

As soon as the locking bolt is fixed 1 orders "Up" and fixes the piston rod clamp.

2 and 3 cast off the ropes, replace them; 2 takes off the brake.

4 and 5 fix the rear gun-clamp.

6 and 7 replace the crosshead.

8 and 9 fix the front gun-clamp.

On completing their duties the detachment form detachment rear.

33. CASUALTIES TO DETACHMENTS.

Men sent up to replace casualties report to their section commanders, who order such changes of duties as they consider necessary.

Casualties are replaced as follows :—

Section commander ...	By the senior No. 1 of the section.
1	By a named successor (usually 10).
With seven men ...	1 performs the duties of 1 and 5. 2 supplies the rammer.
With six men ...	1 performs the duties of 1 and 5. 2 supplies the rammer. 3 performs the duties of 3 and 4.
With five men ...	1 performs the duties of 1 and 5. 2 supplies the rammer. 3 performs the duties of 3 and 4. 4 and 5 perform the duties of 6, 7 and 8.

34. DISABLEMENT.

The extent of the disablement ordered will depend on the time available and the probability of recapture.

To disable the gun so that it can be brought into action immediately after recapture: Close the breech, remove the carrier hinge bolt and lever breech mechanism.

To disable the gun so that it can be brought into action after repair: Remove the piston rod nut and nuts securing the ram and fire the gun.

To destroy the gun: Place an H.E. shell fuze 101 E or 101 B in the muzzle, load with H.E. fuze 101 E or 101 B full charge and fire the gun by means of a long lanyard from under cover. A length of telephone cable attached to the lanyard is suitable for the purpose.

NOTE.—The dial sight and clinometers should always be removed and taken away before abandoning a gun.

35. TINFOIL.

(Provisional.)

Tinfoil is used to prevent coppering or to de-copper guns which are already coppered.

When preparing cartridges 10 places three strips (doubled) diagonally across the front face of the cartridge, binding them on by winding a fourth strip around the circumference.

6 loads the cartridge with the tinfoil to the front.

In the case of guns which are already coppered the amount of tinfoil should be doubled until the bore is clear.

Tinfoil is supplied in strips measuring about 1 in. by 27 in., and weighing a quarter of an ounce.

36. BLANK AMMUNITION.

1. No officer, non-commissioned officer or gunner who has not been trained and passed in gun drill is to command a section or form part of a gun detachment firing blank ammunition at salutes or at training.

2. When firing B.L. blank cartridges, no gun is to be re-loaded within 30 seconds after firing. Even after this interval no gun is to be re-loaded until the chamber and bore have been sponged out and examined by 1.

3. In the event of a missfire a further attempt should be made to fire the gun in its turn. In no case must the breech be opened for at least 1 minute with black powder, and 10 minutes with smokeless charges. No one must be in rear of the breech when it is opened. In firing salutes, an officer or senior non-commissioned officer should be detailed for the special duty of timing the interval after a missfire, and informing 1 of that gun when the breech may be opened.

CHAPTER III.—LAYING AND FUZE SETTING TESTS.

1. In every battery there should be at least six qualified layers and nine qualified fuze setters for each sub-section, exclusive of serjeants and lance-serjeants. A list of layers should be kept. All layers, fuze setters, section commanders, serjeants and lance-serjeants should be tested periodically.

2. All officers and Nos. 1 must be thoroughly conversant with :—

- (i) The tests for and care of sighting gear and sights.
- (ii) The methods of obtaining parallel lines of fire.
- (iii) M.V. correctors and corrections for droop.

3. Layers will be tested by means of two tests: test A will consist of four lays indirect, test B of two lays direct.

4. A maximum of 20 marks will be given for each lay in test A, and 10 marks for each lay in test B. In order to qualify a layer must obtain 81 marks.

5. The examiner should be assisted by an officer or senior non-commissioned officer with a stop-watch and record book, and by a penciller who will take down all orders given for reference when checking the lay.

6. When laying indirect three or more aiming points should be selected to the rear and on either flank, if possible, and made known to all concerned.

7. Before beginning the tests at least five targets will be

selected in the foreground at varying ranges and angles of sight, and covering a front of about 25 degrees; except in the case of targets representing guns, there should be natural features of the ground. If it be necessary to use dummies, they should be placed in positions such as the troops which they represent would naturally occupy on service. A reference point, approximately in the centre of the target zone, will be pointed out to the No. 1 and to the layers; targets will be indicated with reference to this point by means of the clock code.

8. When laying direct on any target (other than a gun target) which extends over a fairly wide frontage, great exactitude in direction will not be required as regards the point originally selected to lay upon, which may be anywhere in that portion of the target opposite to the gun being layed. Any subsequent lay on the same target must, however, be on the same point as the first.

9. The orders for the lay must be given out by the examiner clearly and distinctly, a short pause (about two or three seconds) being made after each separate order, thus: "*All guns, 20 degrees right of zero lines*"—pause—" *All guns, 15 minutes more right*"—pause—" *Angle of sight, 1 degree 20 minutes elevation*"—pause—" *3 degrees 45 minutes.*"

All orders will be acknowledged by the No. 1 and acted on at once. Should a layer at any time be in doubt as to a particular order, he will refer to the No. 1, who may repeat to him any part of the order received. The No. 1 may, in turn, refer to the examiner.

10. After checking a lay, the examiner will elevate the gun about 15 minutes.

11. Layers will be examined in pairs (Nos. 3 and 4); for any incorrect part of a lay marks will be deducted only from the individual making the error.

12. The times allowed for each lay are as follows :—

Test A.				Test B.	
Lay 1. 1' 30"	Lay 2. 0' 35"	Lay 3. 1' 20"	Lay 4. 1' 40"	Lay 5. 0' 45"	Lay 6. 0' 25"

The layer will call out "Ready" as soon as he has finished laying the gun. The time will be taken from the conclusion of the orders for the lay until the word "Ready" from the layer.

13. One mark will be deducted :—

- (i) For every five seconds or fraction of five seconds beyond the time laid down for the particular lay.
- (ii) If the traversing gear is not within 30 minutes of zero except in lays in 2 and 6.
- (iii) For each mistake in the manipulation of the sighting gear or in the drill of the layer as laid down.

14. Ten marks will be deducted :—

If the aiming posts are not planted in line.

15. No marks will be given for the lay :—

- (i) If the sight, clinometer, or elevator indicator is incorrectly set.
- (ii) When laying indirect, if the gun is not correctly layed for elevation and direction.

- (iii) When laying direct, if the gun is not layed for elevation within 3 minutes or for direction within 5 minutes.
- (iv) If the bubble of the cross-level is not central.
- 16. Fuze setters will be tested by three continuous tests.
- 17. A maximum of 30 marks, 10 to be allotted for each test, will be given for the three tests; in order to qualify 25 marks must be obtained.
- 18. Time allowed for each test will be one minute.
- 19. No marks will be given for the test :—
 - (i) If the fuze indicator is wrongly set.
 - (ii) If any fuzes are incorrectly set.
- 20. One mark will be deducted for every five seconds over the time allowed.

EXAMPLES OF TESTS.

Laying Tests.

The gun is placed on a firm platform. The examiner sets the elevation indicator at about 10 degrees and the remaining scales at zero.

Test A (indirect).

Orders.	Procedure.
Lay 1.	
"Aiming point, ..."	The procedure will be as
"All guns, 90 degs. 10 min. right."	laid down under "To lay the gun in the line of fire."
	The battery picket and auxiliary aiming point readings will be recorded on the slate after 4 has reported "Ready."

Orders.	Procedure.
"Aiming posts front."	The procedure will be as laid down under "To plant aiming posts." Time for this part of the lay is not taken.

Lay 2.

"Full charge."	The procedure will be as
"All guns, 1 degree 10 minutes more right."	laid down under "To lay the gun."
"Angle of sight, 1 degree 20 minutes elevation."	
"8 degrees 30 minutes."	

Lay 3.

"Represent No. 2 gun in action."	The procedure will be as
"Target, ..."	laid down under "To change target" and "To lay the gun."
"Reduced charge."	
"All guns, 2 degrees 15 minutes more left."	
"Concentrate 10 minutes on No. 1."	
"Angle of sight, 10 minutes depression."	
"10 degrees 10 minutes."	

Orders.

Procedure.

Lay 4.

"Target,..."

"All guns, 11 degrees 15 minutes right of zero lines."

"Clinometer laying."

"Angle of sight, 1 degree elevation."

"15 degrees 10 minutes."

The procedure will be as laid down under "To change target" and "To lay the gun."

NOTE.—In lays 2, 3 and 4 layers should be exercised in laying from auxiliary aiming points or aiming posts at the discretion of the examiner.

Test B (direct).

The reference point is described before orders are given.

Lay 5.

"Represent No. 3 gun in action."

"Infantry lining hedgerow; 4 o'clock, 3 degrees to 5 degrees."

"Direct laying, dial sight."

"2 degrees 30 minutes."

The procedure will be as laid down under "To lay the gun."

The examiner will put on a deflection and note the reading.

Lay 6.

"All guns, 40 minutes more left."

"2 degrees 50 minutes."

The gun will be re-layed on the same point of the target as in Lay 5.

The deflection ordered will be such as will enable the layer to lay by means of the traversing gear.

Fuze-setting test.**Orders.**

"Corrector 152, 7 degrees 30
minutes."

Procedure.

The competitor will set the fuze indicator at the corrector and the elevation ordered and will set six fuzes at the graduation shown on the fuze indicator.

CHAPTER IV.—SIGHT TESTS.

The field clinometer, sight clinometer and elevation indicator should be tested daily and after prolonged firing. At drill these tests should be carried out frequently to give officers and N.C.Os. practice in doing them accurately. The alignment tests should be carried out as often as possible. The remaining test (cross levelling gear) should be carried out occasionally, but adjustments must only be made by a qualified artificer.

Any adjustment to optical instruments must be carried out by a qualified artificer.

Test I.—To Test the Field Clinometer.

To ascertain the index error—

- (i) Set the clinometer to read zero (degrees and minutes), place the instrument on the clinometer plane of the gun, and by means of the elevating gear bring the bubble into the centre of its run. Turn the clinometer end for end. If the bubble does not remain in the centre of its run bring it there by moving the arm and slider. Note the net reading. Half this reading is the INDEX ERROR of the clinometer.
- (ii) An alternative method may be employed. Procure a clinometer known to be in adjustment, set at zero and place it on the clinometer plane and by means of the elevating gear bring the bubble central. Remove the clinometer. The clino-

meter to be tested is now placed on the clinometer plane and the bubble brought central by moving the arm or slider. The actual reading of this instrument is the INDEX ERROR. A number of clinometers can be quickly and uniformly tested in this manner.

NOTE.—A clinometer when set to read its INDEX ERROR and with the bubble brought central will lay the clinometer plane horizontal.

The clinometer should be adjusted to have no INDEX ERROR, or if this is impracticable, the INDEX ERROR must be applied to all angles to be set on the instrument.

The method of eliminating or adjusting for INDEX ERROR is shown in the Handbook.

Test 2.—To test and adjust the sight clinometer.

With the sight clinometer bracket horizontal and the sight clinometer reading zero, the bubble of the sight clinometer should be in the centre of its run.

Place the sight clinometer, set at zero in its bracket, and bring the bubble to the centre of its run by the elevating hand-wheel. Reverse the sight clinometer end for end; the bubble should still be in the centre of its run.

If the bubble is not in the centre, bring it so by turning the micrometer head. Note the reading and set the micrometer scales to half this reading. Bring the bubble to the centre of its run by the elevating hand-wheel. Slacken the nuts securing the micrometer scales and the screws securing the reader of the degree scale; shift the micrometer scales and reader to zero and re-clamp.

Test 3.—To test and adjust the elevation indicator.

With the sight clinometer reading zero and the bubble in the centre of its run, the elevation indicator should read the elevation at which the gun is layed when the M.V. pointer is set at normal.

Place a shell in the chamber to take up any play in the gear.

Set the sight clinometer at zero, the M.V. pointer at "Normal," the elevation indicator at 10 degrees, and cross-level the sight.

Set the field clinometer at 10 degrees and place it on the clinometer plane of the gun. Elevate and then depress until the bubble is in the centre of its run.

Bring the bubble of the sight clinometer to the centre of its run by the adjusting screws at the front of the supporting bracket.

The locking plates of the screws must first be removed and replaced after adjustment.

Remove the shell from the chamber and reset the muzzle velocity pointer for the M.V. of the gun.

Alignment Tests.

Before beginning the tests the following preparations should be made :—

- (i) Place the carriage on a firm platform.
- (ii) Select a well-defined object at least 1,500 yards distant on which to lay.
- (iii) If this distant object cannot be found, level the carriage transversely, set up the target testing sights (see diagram) about 50 yards in front of the gun at right angles to the axis of the bore.

- (iv) If the carriage cannot be levelled transversely the top of the dial sight carrier and the target testing sights should be sloped to the same angle as the carriage.
- (v) Fix cross-wires at the muzzle of the gun.*
- (vi) Set the elevation indicator and the cowl of the dial sight at zero; set the dial plate and micrometer scales of the dial sight at 3 minutes left deflection (true zero), and set the muzzle velocity pointer at normal.

Test 4.—To test and adjust the dial sight for line.

NOTE.—In practice tests 4 and 5 are carried out simultaneously.

The line of sight through the dial sight should be parallel to the axis of the bore as regards line.

Place the No. 7 dial sight in position. Lay the bore on the distant object for line by the elevating hand-wheel and the traversing gear, using the intersection of the cross-wires as a fore sight and the axial vent as a hind sight. The line of sight through the dial sight should be on the distant object.

When using the target-testing sights lay the bore on point B; the dial sight should be on point D.

If the dial sight is not in alignment bring it so by the adjusting screws on the sight carrier, taking care that the locking nuts are first slackened and tightened after adjustment.

* The cross-wires must be removed on completion of test.

Test 5.—To test and adjust the dial sight for elevation.

The line of sight through the dial sight should be parallel to the axis of the bore as regards elevation when the M.V. pointer is at normal and elevation indicator at zero.

Lay the bore on the distant object for elevation by the elevating handwheel. The line of sight through the dial sight should be on the distant object.

When using the target-testing sights lay the bore on point B; the dial sight should be on point D.

If the dial sight is not in alignment, revolve the milled head at the top of the sight until the line of sight is correct, slacken the nut securing the micrometer collar, revolve the latter to zero and re-clamp.

NOTE.—After adjusting the micrometer collar of the cowl of the dial sight the arrow on the view-finder may not be opposite zero; if confusion is likely to arise, this arrow should be erased and a new one scribed opposite the zero mark.

Test 6.—Test for cross-levelling gear.

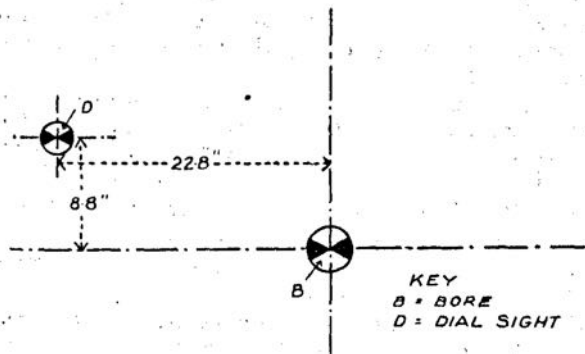
Set the elevation indicator at zero and lay the gun horizontal.

Fix the plane, testing, in the carrier No. 7 dial sight; place a field clinometer set at zero along the transverse positioning marks. Bring the bubble of the field clinometer central by the cross-levelling gear. The bubble of the cross-level should now be central, if not, it needs adjustment. This should be done by a qualified artificer.

NOTE.—Until the "Plane, testing, carrier No. 7 dial sight" is in possession of batteries, the field clinometer will be placed on the top bearing surface of the carrier when testing cross-level.

TARGET TESTING SIGHTS.

60-PR. B.L. GUNS MARK II & II*, CARRIAGES MARK IV.



CHAPTER V.—CARE OF EQUIPMENT.

1. CLEANING AND OILING.

Limber gunners should be intelligent and reliable men.

The projections on the exterior of the gun, which form guides for the latter when sliding in the cradle, should be kept clean and oiled and maintained in good working order; all working surfaces should be well lubricated and kept free from paint.

The bore should be kept clean and lightly greased. After firing, it should be scrubbed with caustic soda and hot water (one pound to a gallon), using the piasaba brush. When dry it should be lightly greased with mineral jelly.

No gritty substance such as sandpaper or bath brick should be used for cleaning working surfaces.

All spare parts should be used periodically to ensure that they are in working order.

The axletrees should be greased frequently, the old grease, particularly from the channels of the pipe box, being removed before new grease is applied. If there is side-play between the wheel and the carriage, the linch pin should be withdrawn and the adjusting collar revolved to a suitable position to take up the play.

Heads of lubricators should be kept free from paint.

2. List of Lubricators.

Fitting to be Lubricated.	No.	Where Situated.
Gun—		
Bearing, B.M. lever	1	On top side of carrier.
Safety shutter	1	On top left side of carrier.
Carrier, hinge joint	1	On top of hinge bolt.
Breech screw and pintle of carrier	1	On top side of breech screw.
Gun guides	2	One on each side.
Carriage—		
Cap squares	2	One on each cap square.
Elevating gear	1	Bracket, elevating shaft.
	2	Elevating gear box.
	1	Bearing bracket, elevating shaft.
	1	Right-hand centre bearing, elevating pinion shaft.
	1	Left-hand centre bearing, elevating pinion shaft.
Traversing gear	3	Pivot and gear box.
	1	Pin, link nut.
Trail clips	1	Clip, rear, trail, right-hand.
		Clip, rear, trail, left-hand.
Guides to cradle* ... each	4	Top of guides.
Carriage clips	1	Bracket, front clip, carriage right-hand.
	1	Bracket, front clip, carriage left-hand.
	1	Traversing pivot.
Brake gear	2	Pivot pin crank levers.
	2	Bolt, brake, hinge bracket.
	2	Bolt, brake, arms.
	1	Nut actuating right-hand.
	1	Nut actuating left-hand.
Cradle	2	Front caps.
Sights—		
Sighting gear	1	Sight rack bracket.
	1	Sight rack brackets, side cover.

Not required when lubricating pads are fitted to gun guides.

3. THE DIAL SIGHT AND CARRIER.

(i) The No. 7 dial sight.

The dial sight when issued is in correct adjustment, water-tight, with all the cells and joints secured by screws. It is very unlikely that the interior will be required to be cleaned, and the dial sight must on no account be taken to pieces except by persons in possession of a certificate from the Artillery College stating that they are qualified to do so.

The body of the dial sight must be cleaned with a clean soft cloth and a little oil, which must be rubbed off afterwards, care being taken that the glass is not touched. The exterior of eye-lens and window should be cleaned with a soft cloth or chamois leather, which must be kept perfectly dry and clean and be used for this purpose only.

Dermatine or rubber eye-guards should not be unnecessarily exposed to extremes of temperature, to the sun's rays, or to bright light.

Oil and grease will inevitably destroy rubber or dermatine, and prolonged contact with benzol, petrol and chemicals is undesirable. If, however, oil or grease gets on the eye-guard, it should be immediately removed, either :—

- (i) By wiping with a clean rag soaked in benzol or petrol.
- (ii) By washing in water to which a little soap and soda have been added.
- (iii) By wiping off with a clean dry rag.

The No. 7 dial sight should be removed from the carrier before travelling any distance, and when not in use must be kept in the case provided for the purpose.

(ii) The No. 9 carrier.

The carrier should be handled with care and kept free from rust. It should be lightly smeared with mineral jelly when not in use. The spring of the sight clinometer should be kept in good order to prevent slipping during firing.

To avoid damage when travelling long distances, if the tactical situation permits, the carrier should be removed and carried in the box provided for the purpose.

4. THE BREECH MECHANISM.**(i) General precautions.**

The breech mechanism should be dismantled periodically in order that it may be thoroughly cleaned.

The threads of the breech screw should be free from burrs. Should the screw not work easily when the obturator has been detached, the defect may often be remedied by careful filing by an artificer, but no portion of the thread should be cut away to remove a crack.

The breech should be kept covered up when possible to prevent dust and grit getting into the breech fittings. A cover is provided for this purpose.

The obturating pad should be examined to see that the cover is intact and in working order. If the cover is found to be loose or to overlap the protecting disc, the obturator should be changed.

The spare pad should be kept in the box obturator.

The protecting disc and steel rings should be carefully examined, and they should be exchanged if either are eroded, burred or cracked.

When fitting the pad and discs on the axial vent, care must be taken that they are assembled in the correct order. The face of the pad marked "front" should be towards the muzzle. One or more steel adjusting discs may be required between the obturator and the face of the breech screw when the pad is compressed by firing, but the obturator should always turn freely.

The obturating pad should be a close fit in the coned seating of the chamber when the breech is closed. To ascertain this, lightly cover the seating with a mixture of oil and tallow; close and open the breech; the outer edge of the pad should be covered with grease from contact with the greased seating of the chamber. If it is found that the pad does not fit the seating closely, adjusting discs should be added until the breech closes with some difficulty. The breech should then be opened and closed until it works easily. Before use, the pad and disc should be well covered with tallow.

Every opportunity should be taken to keep the obturator and axial vent cool. This can be done by pouring water over them in position, or by sousing them thoroughly with a sponge cloth during or after firing.

The obturator should never be dismantled when hot if this can possibly be avoided.

When a new pad is fitted, it must be expanded with a full charge.

(ii) To dismantle the breech mechanism.

Before removing the breech mechanism, first open the lock and secure it in the open position by means of the firing peg of the firing lanyard, placed in a hole for its reception in the

rear face of the slide box, then open the breech and secure the breech mechanism into the loading position.

Lock "P.J.," slide box "W" and vent axial.—Remove the keep pin from the retaining pin in the left of the carrier, partly withdrawing the retaining pin.

Unscrew the lock and slide box from the vent axial. Withdraw the spring vent axial and vent axial with obturator.

Breech screw.—Insert a screwdriver in the slot of the pin, actuating, retaining plate, press in the pin and partially revolve it by means of the screwdriver until the indicating arrow on the pin corresponds with the middle of the word "dismantle" on the breech screw. Withdraw the breech screw from the front end of the carrier.

Roller.—Remove the keep pin and roller axis pin and withdraw the roller.

Safety shutter.—Partly release the stop screw and withdraw the pin retaining slide box and safety shutter. Revolve the safety shutter until the feather coincides with the featherway in the carrier. Withdraw the safety shutter to the rear.

Lever breech mechanism of crankshaft and bearing.—Swing the carrier and lever breech mechanism into the closed position. Withdraw the keep pin and the bolt securing crankshaft bearing.

Withdraw the bearing and crankshaft with the lever breech mechanism from the carrier and receive the cross-head from the inside of the carrier. Remove the screw securing lever breech mechanism and withdraw the lever breech mechanism from the crankshaft.

Catch retaining lever breech mechanism closed.—Remove the pin securing retaining block, slide the block with spring complete to the lower end of its recess and withdraw.

Carrier.—Withdraw the keep pin from the hinge bolt. Remove the hinge bolt, carrier and bearing washer and remove the bracket and lever actuating guide block.

To withdraw the carrier independently of the breech screw, partially revolve the pin actuating retaining plate as described for removal of breech screw. Remove the carrier hinge bolt, unscrew the slide box and lock and withdraw the axial vent spring. Unscrew the fixing screws of the shot guide actuating lever bracket and remove the bracket. Withdraw the carrier to the rear.

Shot guide.—Remove the keep pin and securing nut from the axis stud. Remove the guide block. Remove the fixing screws from the bracket actuating lever and remove the bracket and lever actuating guide block.

(iii) To assemble the breech mechanism.

The breech mechanism is assembled in the following order:—

- (a) Shot guide.
- (b) Carrier.
- (c) Safety shutter.
- (d) Breech screw with crosshead in position.
- (e) Catch retaining lever breech mechanism closed.
- (f) Lever breech mechanism, crankshaft and bearing.

Close the breech, taking care to see that the breech screw is fully locked. See that the cross-

head is in the centre of the recess for the crank-shaft, place in the lever breech mechanism, crank-shaft and bearing together. Secure the bearing by its bolt and keep pin.

- (g) Axial, vent, with obturator.
- (h) Spring, vent axial.
- (i) Lock and slide box.

(iv) To dismantle the lock "P.J." and slide box "W."

(a) *Lock*.—Close the lock, remove the keep pin, securing cocking cam and cover; withdraw the cover and cocking cam. Remove the stop screw of the actuating lever, then turn the actuating lever downwards (left-handed screw) until vertical and withdraw the lock from the slide box. Unscrew the actuating lever from the lock frame and withdraw the main spring and striker.

(b) *Slide box*.—Withdraw the extractor; withdraw the keep pin, plunger, retaining lock and actuating lever with spring. Remove the screw retaining and retractor lever.

(v) To assemble lock "P.J." and slide box "W."

The lock and slide box are assembled in the reverse order.

(vi) To test protrusion of the striker.

The lock must occasionally be removed from the slide box and the protrusion of the striker tested with the "gauge protrusion striker No. 10." The firing pin should foul the minimum and clear the maximum recess; if not the striker must be exchanged.

5. RECUPERATOR AND BUFFER.

General Precautions.

(i) Before firing.

Care should be taken to see that the recuperator and buffer are correctly charged, that there is no abnormal leakage at the stuffing-boxes, that the isolating valve is open, that the cylinder block is firmly nutted up to the lug of the gun, and the piston rod and ram to the front cradle cap, that the cut-off gear is in adjustment and that no keep pins are missing.

See that the tell-tale of the floating piston is in the correct position, i.e., outer edge flush with front of cover.

It is necessary to strain the oil before charging the recuperator or buffer.

During severe weather, recuperators and buffers should be protected as much as possible from the cold.

Any operations for the replacement of worn or defective parts which necessitate emptying the recoil system should be carried out only under qualified supervision.

Recuperator and buffer cylinders should be washed out with paraffin to remove grit as opportunities offer.

(ii) In action.

During action the functioning of the system should be carefully watched and steps taken to remedy defects at once.

The following are the more common faults.

For any given fault the causes and remedies are set out in the sequence which should be followed to ascertain the particular cause and remedy, so that the simplest and most readily removed causes may be eliminated before proceeding to the more difficult.

Fault.	Cause.	Remedy.
Recoil violent ...	Air in buffer cylinder ...	Operate snifting valve.
	Insufficient liquid in buffer system.	Fill buffer and tank.
	Reduced air pressure in recuperator.	Test and recharge recuperator.
Recoil excessive ...	Wear of piston and valve	Adjust by cut-off gear.
	Buffer nearly empty ...	Fill buffer and tank.
Recoil short ...	Damaged slides ...	Examine and repair.
	Excessive air pressure ...	Test and expel surplus.
	Wrongly set cut-off gear	Test and adjust gear.
	Excess of liquid in recuperator.	Test and recharge recuperator.
Run out slow ...	Packings too tight ...	Repack.
	Valve adjusting run-out incorrect.	Open valve.
	Burrs or grit on slides ...	Remove obstruction.
	Reduced air pressure ...	Test and adjust pressure.
	Packings too tight ...	Repack.

Fault.	Cause.	Remedy.
Run-out violent ...	Valve adjusting run-out incorrect. Excessive air pressure ... Retarding valve fast in open position.	Close valve further. Test and expel surplus. If this is suspected and a few rounds fail to move it, then strip recuperator and replace valve.
Failure to run-out ...	Too much liquid in buffer Air in buffer ... Valve adjusting run-out closed. Burrs or grit on slides ... Reduced air pressure in recuperator. Packings too tight ...	Operate snifting valve. Operate snifting valve. Open valve. Remove obstruction. Test and adjust pressure. Repack.

NOTE.—Reduced air pressure may be due to air alone, or may be caused by leakage of liquid from recuperator; the precise cause should be ascertained.

NOTE.—At high angles of elevation the valve adjusting run-out may require adjustment.

If the buffer tank or pipe is damaged the isolating valve must be closed.

(iii) **When guns are resting in action.**

Cool the bore. Allow air to escape from the buffer by means of the snifting valve. Replenish the buffer. Tighten packings if necessary. Replenish recuperator with liquid, if necessary, after the gun has cooled.

6. THE RECUPERATOR.

(i) **General precautions.**

Before the front cradle cap is removed the gun must be secured to the cradle so as to prevent it from slipping back.

If the cradle cap is to be left off for a long time, the elevating hand-wheel should be taken off.

(ii) To charge the recuperator with liquid.

Secure the gun to the cradle and level the cradle longitudinally. Disconnect the cut-off gear, piston rod and ram. Remove the cradle cap. Discharge any air pressure in the air chamber by removing plug L and opening the valve M. Remove the plug "C" from recuperator ram and plug "B" from the recuperator.

Attach the pump connection and adapter at "C."

See that the tell-tale rod is in a position equal to $\frac{1}{2}$ inch inside its cover. (This will allow for leakage which will occur.)

Pump in oil until it overflows freely at hole "B."

Replace plug "B," disconnect pump connector and adapter and replace plug "C." When correctly charged it should contain 27 pints of oil.

(iii) To charge the recuperator with air.

Before charging the recuperator with air, it is important to see that the securing collar is in position on the recuperator ram, in order to prevent the ram from being forced out to the rear when under pressure, and that the correct quantity of liquid is in the recuperator.

Attach the air pump to the brackets on the trail. Remove plug L and attach the adapter and pressure gauge; connect the pump pipe to the adapter. Open the valve M and pump until the gauge registers 610 lbs. a square inch. Close valve M, disconnect the pipe from the adapter and place the cap on the adapter. Let the pressure down slowly to 600 lbs. a square inch by opening valve M slightly and slacking

back the cap on the adapter. When the pressure reads 600, close valve M, remove the adapter with pressure gauge and replace plug "L."

Release oil if necessary to correct the position of the tell-tale rod.

(iv) To test the air pressure.

See that the tell-tale rod of the floating piston is in its correct position.

Remove plug "L." Screw on the adapter with the end cap in position.

Screw the gauge into the adapter.

Open valve "M." when the gauge should register 600 lbs. a square inch. If the pressure is correct close valve "M," remove the adapter and gauge and replace plug "L." If the pressure is not correct close valve "M," connect up the air pump, and make up the pressure to 600 lbs. a square inch.

(v) To test and adjust for liquid in air cylinder.

Secure the gun to the cradle and elevate to maximum elevation, remove "plug" (L) and open "valve" (M) about two turns.

If air alone escapes there is no leakage; close the valve. Should liquid show allow it all to escape before closing the valve.

Recharge with air in the usual way, up to the correct pressure.

If leakage of oil into the air cylinder continues, the packing of the floating piston must be examined and replaced if necessary.

(vi) To test and adjust for aeration of liquid in recuperator.

Secure the gun to the cradle, remove the cap and elevate to about 10 degrees; unscrew plug (B) about two turns. If liquid flows, close the plug; but if froth appears, air has leaked into the liquid. Allow the froth to blow out until liquid flows, then close the plug and make up loss of oil in the usual manner.

Should the amount of froth be excessive, it will be necessary to strip the recuperator and to examine the packings, replacing any that may be defective.

(vii) To replenish air pressure lost by leakage.

Proceed as for charging the recuperator with air, but before opening valve "M" to admit air to the recuperator, pump the pressure in the pipe to 600 lbs. a square inch, and see that the correct amount of liquid is in the recuperator.

(viii) To replenish oil lost by leakage without releasing the air pressure.

Leakage from the recuperator, if not excessive, can be made up by means of the screw pump. It is not necessary to release the air pressure for this purpose. Proceed as follows:—Fill the pump, turn the nozzle upwards, and give a few turns to the screw in order to remove any air. Remove plug C, screw the pump into place in the filling hole and operate the pump by means of the handle. If necessary, repeat the operation until the tell-tale rod is flush with the end of its cover.

Then test for oil leakage into air cylinder. Disregard of this may lead to dangerous pressures in the air reservoir and consequent damage to the equipment.

NOTE.—The tell tale rod must not be allowed to protrude outside its cover beyond the copper band.

7.—THE BUFFER.

(i) To fill the buffer.

Level the gun longitudinally. Remove the filling-hole plug from the tank. See that the isolating valve is open. Open the snifting valve to allow any air in the buffer cylinder to escape and pour in oil until about half-way up the sight glass. Replace the filling plug. About 24 pints of oil are required to charge the buffer and tank.

Leakage from the buffer is automatically made up from the oil tank when the isolating valve is open.

Should the tank or the pipe connection of the oil tank be damaged, the buffer can be charged by removing the isolating valve and using a funnel. Care should be taken to see that the isolating valve is replaced before firing.

(ii) Cut-off gear.

The cut-off gear is correctly adjusted when the elevation on the graduated collar at the front of the buffer piston rod agrees with the elevation on the indicator attached to the bracket supporting arm.

Should the recoil at any angle of elevation be excessive the adjusting sleeve on the rod actuating cut-off gear should be adjusted.

When the nominal working length has been obtained the adjusting sleeve should be screwed up two turns, shortening the recoil about 2 to 3 inches.

(iii) **Emergency cut-off gear.**

Should the cut-off gear become damaged the gun can be kept in action at any angle of elevation by means of this gear.

The damaged gear should be taken off leaving the segment on the piston rod free to rotate.

When the gun is layed, note the elevation on the indicator on the bracket supporting arm and set the graduated collar at the front of the piston rod to agree.

Remove the keep pin and screw down the locking plunger so that the serrations on the plunger engage those of the segment and replace the keep pin.

Should recoil be excessive the rotation of the piston rod should be advanced a few notches.

(iv) **Valve adjusting run-out.**

Should the gun not run out correctly for the last few inches, when air from the buffer cylinder has been released by the snifting valve, adjust the valve by means of the key according to the instructions on the instruction plate above the valve.

NOTE.—The key must be removed before firing.

(v) **Glands.**

Glands should be tightened when necessary. It is better to do this when the cradle is warm, as the packings then seat better. They should not be overtightened, as this may distort the floating rings and also cause seizure.

To tighten up the glands :—Open the door provided in the underside of the front cradle cap and tighten up the gland by means of a tommy. If a gland has been over-tightened and it is desired to slacken it, the spring pawl must be pushed up and twisted to lock it before the gland can be turned.

If a leakage occurs at the glands and tightening up does not prevent it, the packing should be removed.

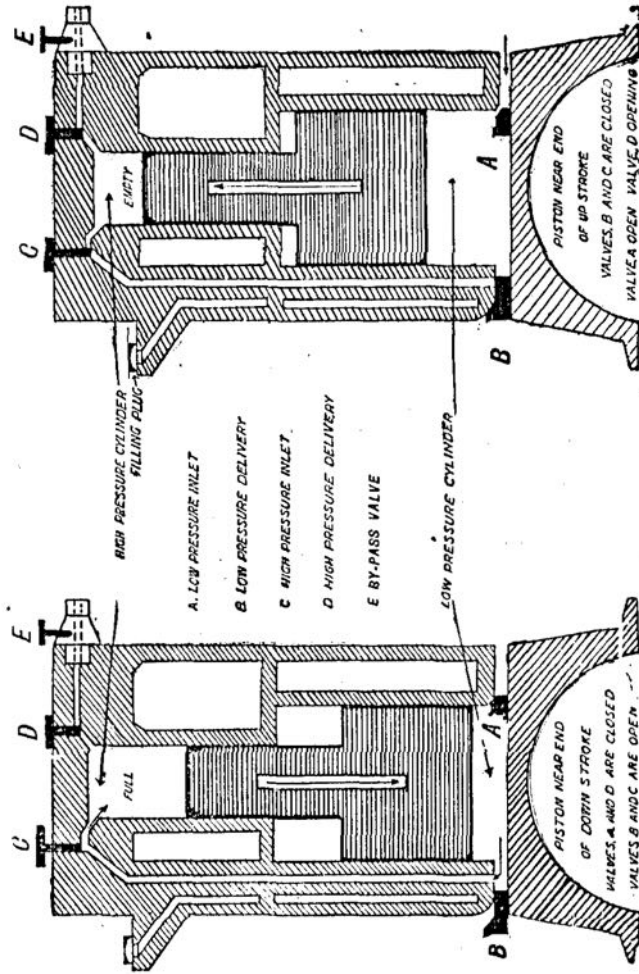
8.—THE AIR PUMP.

A dust cover and two lifting bars are provided with the pump. The cover must be kept on when the pump is not in use.

The water jacket must be kept filled when the pump is in action. In cold weather empty the jacket immediately after action and close valve A to prevent dirt and grit entering the cylinder when standing. Open again when putting the pump into action and set the sight feed lubricator to give eight drips a minute.

Before charging the recuperator it is advisable to test the pump system as follows : Close the air charging valve of the recuperator. Work the pump slowly until the gauge registers 600 lbs. a square inch. If the system is in good working order the gauge hand should remain stationary, or only creep back very slowly. Should the hand fall back quickly the system should be examined for external faults. Faults may be located by smearing wheel grease over the joints ; air bubbles will be observed where there is a leak.

Great care should be exercised in using the gauge. When taking or releasing pressure the valve should be opened gently, in order to prevent damage to the gauge.



If the pump only gives 20 lbs. pressure, valves B and C are faulty. If the pump only gives 200 lbs. pressure valve D is faulty. If no air is delivered valve A is faulty. If the valves are proved to be in order, look to the packing rings of the piston. In the event of valve D going out of order and no spares being available, replace it with valve B; valve C should not be used for this purpose.

If necessary the valves should be lightly ground in and coated with thin oil.

9.—DISMOUNTING AND MOVING THE GUN.

(i) To dismount the gun (G.S. wagon method).

Stores required :—

Wagons, G.S.	...	...	...	...	1
Picks ...	...	...	...	...	1
Shovels	...	...	...	...	1
Handspikes	...	...	...	...	2
Planks	...	...	...	...	2
Rollers, 3 ft. × 6 in....	...	...	...	...	2
Skids, 3 ft. × 6 in. × 3 in.	...	...	...	...	4
Scotches, large	...	...	...	...	8
Dragropes, heavy	...	...	...	pairs	1
Crosshead	...	...	...	...	1
Men required	...	...	...	...	10

Select a level piece of ground.

Slightly sink the trail and remove the breech mechanism. Bring the gun horizontal, disconnect the front mts and pull the gun back far enough to take off the nut which secures the cylinder block to the gun lug, and the brass filling pieces

of the gun slides. Disconnect the pipe from tank to buffer, first closing the isolating valve. Support the cradle with skids across the trail. Push the recuperator block to the front and secure it by the front nuts.

Put two 9 ft. planks in a G.S. wagon as far apart as possible. Run the wagon over the trail until it touches the cradle a roller must be held in position between the lug and guides of the gun before the wagon is fully back. Scotch the wagon wheels.

Haul the gun back with crosshead and ropes until at 56 inches recoil, allow the roller (which will now be over the rear axle of the wagon) to take. Haul the gun back until the front end of the guides are one foot inside the cradle.

Place a 3 ft. \times 6 in. \times 3 in. skid or a handspike under the gun just in front of the trunnions and resting on the cradle so that the muzzle slides on it, care being taken not to foul the cut-off gear. Haul the gun back until the guides are clear of the cradle and the breech is against the front of the wagon.

Lift at the muzzle and insert a roller or skid under the gun immediately above the rear axle of the wagon.

NOTE.—When mounting arrange to start with a roller so placed that it will clear the rear of the guides as they enter the cradle.

(ii) **To dismount the gun (plank and roller method).**

Stores required :—

Luff tackles	...	...	...	...	...	2
Picks	...	...	...	...	...	1
Shovels	...	...	...	...	...	1
Handspikes	...	...	...	...	...	2

Stores required—(continued):—

Rollers, 3 ft. × 6 in....	...	...	...	3
Scotches, large	...	...	...	8
Planks, 10 ft. (or 9 ft.)	...	...	...	4
Skids—				
3 ft. × 4 in. × 5 in.	...	...	...	4
18 in. × 4 in. × 5 in.	...	...	...	2
3 ft. × 6 in. × 3 in.	...	...	...	2
Measuring tape	...	...	...	1
Men required	...	...	...	10

Select a level piece of ground.

Slightly sink the trail and remove the breech mechanism.

Bring the gun horizontal, disconnect the front nuts and pull the gun back far enough to take off the nut which secures the cylinder block to the gun lug, and the brass filling pieces on the gun slides. Disconnect the pipe from tank to buffer, first closing the isolating valve. Push the recuperator block to the front and secure it by the front nuts.

Place a handspike in the breech and attach a sling or drag-rope.

Make fast a luff tackle on either side to ease the gun down the slope. Turn the bar supporting cradle upside down and place it across the trail just in front of its normal position and elevate on to it.

Place a 3 ft. × 4 in. × 5 in. skid on its edge across the trail in rear of the cradle and two 18 in. × 4 in. × 5 in. skids on edge on the rear of the trail. On to these rest two 10 ft. or 9 ft. planks with their inside edges about 8 in. apart, supporting their lower ends on suitable skidding.

Haul the gun back, and allow a 6 inch roller to take as soon as the guides begin to leave the cradle. Continue to haul

to the rear until the front end of the guides are 1 ft. inside the cradle.

Place a 3 ft. \times 6 in. \times 3 in. skid or handspike under the muzzle and on the cradle close to the trunnions, care being taken not to foul the cut-off gear; haul to the rear until the guides leave the cradle, place another roller under the guides of the gun.

Prolong the ramp and move the gun to the ground.

NOTE.—When mounting arrange to start with a roller so placed that it will clear the rear of the guides as they enter the cradle.

APPENDIX.

CARRIAGE OF STORES.

1.—Stores carried on the carriage.

Article.	No.	Where carried.
Apparatus, illuminating sight, No. 5.	1	In case on left side of trail.
Bits, vent, 14-inch	1	On right side of trail.
Box sight	1	In trail.
Brush, breech screw	1	In tool case on right side of saddle.
Can, lubricating, No. 9	1	On right side of trail.
Cap, sponge, No. 9	1	On the rammer and sponge.
Carrier, No. 7 dial sight, No. 9 ...	1	In sight box.
Case, tool	1	On right of saddle.
Clinometer, sight	1	In sight box.
Crosshead, hauling ropes	1	On the breech.
Hammer, claw, 32 ounces	1	In tool case.
Handspikes, lifting	2	On right side of trail.
Lever, front nuts	1	On left side of trail.
Pincers, carpenters ... pairs	1	In tool case.
Posts, aiming—		
With flag	1	In sight box.
Square and circular head ...	2	On right side of trail.
Rammer and sponge	1	On left side of trail.
Rimer, vent axial, .303-inch Chambers, No. 2.	1	In pocket on right of trail.
Sight, dial, No. 7	1	In sight box.
Sight, dial, No. 1	1	In sight box.
Spanner, adjustable, 15-inch ...	1	In tool case.
Spanner, No. 189	1	In tool case.
Tool, adjusting run up and isolat- ing valve	1	In pocket on the right side of cradle.

2. Stores carried on the limber.

Article.	No.	Where carried.
Adapter, pump, pipe	1	In near limber box.
Bar, supporting, draught pole, No. 4 (spare)	1	On top of futchels, front of limber
Borer, vent axial, 303-inch chamber,	1*	In off limber box.
Box, grease, 3 lb.	1	Under limber.
Box, obturator	1	In near limber box.
Box, spare springs, keep pins and washers, No. 1.	1	In off limber box.
Brush, water carriage	1	In pocket, near side of limber.
Buckets, water, G.S., canvas ...	2	In wire net receptacle.
Cap, dust, 1st class, "B" capped wheels (spare).	1*	In near limber box.
Case, No. 8 or 8A cleaner	1	On cleaner piasaba, No. 17.
Cleaner, piasaba, No. 17	1	On top of futchels, front of limber.
Clinometer, field, in box	1	In off limber box.
Collar, adjusting, 1st class, "B" capped wheel.	1*	In off limber box.
Covers, rifle	2	On rifles.
Disc, adjusting, obturator (spare)	2	In obturator box.
Draft, No. 12	1	In near limber box.
Files, smooth, H.S.M., 8-inch ...	1	In off limber box.
Funnel, filling cylinder, No. 3 ...	1	In off limber box.
Gauge, pressure, No. 5	1	In off limber box.
Gauge, striker protrusive, No. 10	1	In "box, spare springs, etc."
Handle, file	1	In off limber box.
Implements, ammunition:—		
Keys—		
No. 18	2	In off limber box.
" 32	2	In off limber box.
" 48	2	In off limber box.
" 53	2	In off limber box.

2. Stores carried on the limber—*continued*.

Article.	No.	Where carried.
Implements, ammunition— <i>cont.</i> —		
Keys, No. 59	2	In near limber box.
Lanyard, firing, No. 35	2	In tube pocket.
Lashing, tarred, 1-inch, 10 feet	4	In wire net receptacle.
Obturator	2	In obturator box.
Ordnance, B.L.—		
Block, retaining spring, B.M. lever, catch (spare)	1*	In "box, spare springs, etc."
Catch, B.M. lever	1*	In off limber box.
Crosshead	1*	In off limber box.
Extractor, box slide, "W"	1	In "box, spare springs, etc."
Lock, percussion, "P.J." (spare)	1	In off limber box.
Pin, axis, roller, breech screw (spare)	1*	In off limber box.
Pin, securing, spring, retaining block (spare)	1*	In "box, spare springs, etc."
Plate, catch, B.M., lever (spare)	1*	In "near limber box."
Plate, retaining, breech screw (spare)	1*	In near limber box.
Springs—		
Actuating pin (spare)	1	In "box, spare springs."
Catch, B.M., lever (spare)	1	In "box, spare springs."
Lock, actuating lever, retaining plunger, box slide, "W" (spare)	1	In "box, spare springs."
Main, lock, percussion "P.J." (spare)	1	In "box, spare springs."
Vent, axial (spare)	1	In "box, spare springs."
Striker, lock, percussion, P.J. (spare)	1	In "box, spare springs."
Vent, axial	1	In near limber box.
Washer, bearing (spare)	1	In "box, spare springs, etc."
Pins, keep, split—		
$\frac{1}{8}$ in. \times $2\frac{1}{2}$ in. (spare)	1	In "box, spare springs, etc."
$\frac{3}{16}$ in. \times $2\frac{1}{2}$ in. (spare)	1	In "box, spare springs, etc."

2. Stores carried on the limber—continued.

Article.	No.	Where carried.
Pins, keep, split— <i>cont.</i>		
$\frac{3}{16}$ in. \times 2 in. (spare) ...	1	In "box, spare springs, etc."
$\frac{1}{8}$ in. \times 2 in. (spare) ...	1	In "box, spare springs, etc."
$\frac{3}{16}$ in. \times $\frac{3}{16}$ in. (spare) ...	2	In "box, spare springs, etc."
Pins, linch, 1st class, "B" capped wheels (spare)	1*	In off limber box.
Pockets, key spring lock, 2 keys	2†	On limber box.
Pockets, tube, with strap	1	In off limber box.
Pump, hand, suction and force, screw acting, No. 1.	1*	In near limber box.
Rifles, short, M.L.E. ...	2	On foot board.
Ropes, drag, heavy (pairs) ...	1	In wire net receptacle.
Ropes, drag, heavy (pairs) ...	1	On top of futchels, front of limber.
Ropes, hauling gun ...	1	On top of futchels, front of limber.
Screwdriver, G.S., 4-inch	1	In off limber box.
Spanners—		
No. 337... ..	1	In near limber box.
" 338... ..	1	In near limber box.
" 339... ..	1	In off limber box.
" 340... ..	1	In off limber box.
" 341... ..	1	In off limber box.
Stays, outrigger (b) ...	2	On limber frame.
Swingletrees, No. 12 (b) ...	4	On limber frame.
Swingletrees, No. 12 (spare) ...	1	On limber frame.
Tallow, in box (lbs.) ...	1	In near limber box.
Tommy—		
No. 45	1	In off limber box.
" 46	1	In off limber box.
Washers, drag, 1st class, "B" capped wheel (spare)	1*	In off limber box.
Wrenches, adjusting, No. 7 dial sight, and carrier.	1‡	In off limber box.
Wrench, B.M., No. 194 ...	1	In near limber box.

* For each section. † Component of limber. ‡ For 3 guns.

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